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④ Hinged vehicle window assembly.

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### Description

This invention relates to vehicle window assemblies and, more particularly, to an improved hinged window assembly wherein the hinges are bonded directly to the surfaces of the window pane without the necessity of drilling or causing any hinged securing structure to extend through the window pane.

In recent years, it has been common to provide pivotally hinged windows in passenger automobiles, trucks or vans to facilitate ventilation. Such windows are pivoted either on a vertical or horizontal axis so that they may be opened from between a few inches to several feet. A common technique in manufacturing such windows is to drill one or more holes through the window glass near the peripheral edge of the glass and bolt a hinge plate to the glass which can then be fastened in some manner to a support on the body of the vehicle. Such holes must be drilled before the glass is tempered and substantial material loss often results because of the breakage or chipping which occurs during such drilling. In addition, such hinged structures are relatively heavy and provide a substantial structure which must be covered or trimmed over to maintain the aesthetic qualities in and around the window.

A recent proposal in a window assembly includes a window pane bonded to a moulding strip of polyvinyl chloride and secured in a larger assembly or frame such as that shown in United States Patent 4,139,234, wherein the moulding strip provides a "living hinge". Another known window assembly, described in GB-A-1215267, has a window pane embedded in a rubber strip, flexing of the rubber providing the hinging movement. This prior assembly displays the features of the pre-characterising portion of claim 1. With the recent emphasis on vehicle weight reduction for energy conservation purposes, it was desired to provide an alternative to such hinged window assemblies which were lighter, provided equal or greater reliability to environmental and weather conditions and also could provide anti-theft and anti-vandalism security for the hinged windows. Such features were desired in an assembly in which the bulk of the hinge was kept to a minimum and the attachment of the assembly to the vehicle could be made substantially entirely from the exterior of the vehicle while keeping any fastening concealed from the vehicle exterior after installation of the assembly.

According to the present invention a hinged window assembly for vehicles comprises: a window pane having front, back and peripheral edge surfaces; hinge means for moving the window pane between at least an open and a closed position and including a flange for fastening the hinge to the windowpane, the flange being directly and rigidly secured to the window pane by being bonded by bonding means to at least one of the surfaces of the window pane at a specified location without any structure extending into or through the window pane; a sealing

means cooperating with the window pane for attachment to a portion of a vehicle and forming a weather seal between the window pane and the vehicle portion when the assembly is installed on a vehicle and the window pane is in the closed position; and wherein the assembly is adapted for installation substantially entirely from the exterior of a vehicle; characterized in that the assembly comprises a plurality of hinge means formed from metal and including attaching means for attaching the hinge means to a portion of a vehicle and a metal flexing portion which connects the flange and the attaching means; the metal flexing portion spacing the window pane from the attaching means and adapted to flex and provide movement of the flange and the window pane with respect to the attaching means when the pane is moved between the open and the closed positions.

5 The bonding means preferably includes an adhesive chosen from the group of adhesives which include anerobic polyacrylate cement, vinyl acetate/phenol formaldehyde, or epoxy cement, or in a heat activatable epoxy cement adapted for activation by induction heating. In one embodiment the hinge has a metal flexing portion formed from resilient sheet material, and is spaced from the window pane and between it and the attaching means.

10 20 25 30 35 40 The hinge plate may include flange means forming a channel for receiving and securing a portion of a peripheral edge of the window pane; the bonding means being intermediate interior portions of the flange means and the window pane in the channel and securing the hinge plate to both the front and back surfaces of the window pane. In a preferred embodiment the means for attaching the hinge to a portion of a vehicle include a concealed clip adapted to be received over a flange of a sheet metal vehicle body.

45 50 Sealing means are preferably present which cooperate with the window pane for attachment to a portion of a vehicle and forming a weather seal between the window pane and the vehicle portion when the assembly is installed on the vehicle and the window pane is in its closed position. Such sealing means may include receiving means for receiving a portion of the hinge means whereby the sealing means are secured on the hinge means adjacent the window pane for sealing engagement therewith when the window pane is closed.

55 60 65 The sealing means may be formed from flexible, resilient sealing material and includes channel means for receiving a flange of a vehicle body adjacent a window opening and an integral sealing member extending along the channel means for engaging the window pane.

In one form of hinged window assembly according to the present invention the peripheral edge surface of the window pane includes a trim member extending along the edge of the window pane to provide the assembly with a finished appearance.

A hinged window according to the present

invention provides numerous advantages over prior known assemblies including a significant saving in weight which helps fuel conservation in modern vehicles, a greater durability and better security against vandalism and theft due to the provision of metallic hinges, the elimination of any drilling or machining procedures on the window glass itself which saves the rejection of a substantial number of windows by eliminating chipping and breakage and providing significant savings in installation time by allowing installation substantially entirely from the exterior of the vehicle during manufacture. The concealment of the fastening apparatus which secures the assembly to the vehicle can be readily achieved providing a cleaner more aesthetic appearance.

The invention may be carried into practice in various ways but a number of hinged window assemblies embodying the invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a hinged window assembly with portions broken away and shown in section;

Figure 2 is a perspective view of a window opening in the sheet metal body of a typical vehicle over which the window assembly shown in Figure 1 is designed to be installed and illustrating a portion of the hinged window assembly in its installed position;

Figure 3 is a fragmentary, perspective view of a typical vehicle body pinch-weld flange and one form of a hinge member used in the hinged window assembly;

Figure 3a is a perspective view of the hinge member shown in Figure 3 with a window pane secured therein;

Figure 4 is an exploded sectional view of the several elements of one form of the hinged window assembly and a typical vehicle body pinch-weld flange over which the assembly is designed to be installed;

Figure 5 is a fragmentary, sectional view taken along line V-V of Figure 1 illustrating the several elements of the hinged window assembly of Figure 4 as assembled;

Figure 6 is a fragmentary, sectional view of the hinged window assembly of Figure 5 assembled on the pinch-weld flange of a vehicle body;

Figure 7 is a fragmentary, sectional side elevation of another portion of the hinged window assembly taken along line VII-VII of Figure 2;

Figure 8 is a fragmentary, sectional view of a pivotal latch member used with the hinged window assembly;

Figure 9 is a fragmentary, sectional view of an alternative form of hinged window assembly;

Figure 10 is a fragmentary, sectional view of a further alternative form of hinged window assembly;

Figure 11 is a fragmentary, sectional view of a modified form of hinged window assembly;

Figure 12 is a fragmentary, sectional view of another modified form of hinged window assembly;

Figure 13 is a fragmentary, sectional view of a further modification of hinged window assembly;

Figure 14 is a fragmentary, sectional view of another modified form of hinged window assembly; and

Figure 15 is a fragmentary, sectional view of yet another modified form of hinged window assembly.

Referring now to the drawings in greater detail, Figures 1 to 8 illustrate various aspects of one embodiment 10 of a hinged window assembly. Hinged window assemblies, like that shown at 10, are generally designed for use as a hinged sidelight in an automobile, truck, van or other vehicle and includes a pane of transparent, tempered glass 12 having an external contour designed to fit over a window opening such as that shown at 14 in Figure 2. The window opening 14 is formed in the rear quarter panel of an automobile and is defined by the body sheet metal of the vehicle, specifically, a pinch-weld flange 16 as is seen in Figures 3, 4, 6 and 7. The pinch-weld flange 16 is formed from parallel flanges spot welded together and extending from the external sheet metal 18 and internal sheet metal 20 of the vehicle body. As explained hereinafter, the pinch-weld flange 16 receives the hinge members from the window assembly 10 as well as a sealing weather strip.

The assembly 10 also includes at least one and preferably a pair of hinge members 25 bonded securely around one edge 13 of the window pane 12, and in certain embodiments, a closed length of sealing weather strip 40 which cooperates with the hinge members and the window pane and is adapted to be secured on the pinch-weld flange 16. In the assemblies herein, a pair of hinges are secured to the forward portion of pinch-weld flange 16 of window opening 14 so that pane 12 pivots about an essentially vertical axis. Of course, other assemblies within the scope of the invention may be positioned for pivotal movement about a horizontal axis or axes of other orientations. Also, only one or no more than two hinge members may be used.

As is best seen in Figures 1, 3, 3a and 4, the preferred form 25 of the hinge members used in the present assembly is stamped from flexible resilient sheet metal such as spring steel having a gauge of 0.76 mm to 1.52 mm (0.030 0.060 inches). Each hinge member 25 preferably includes a fastening flange 26, preferably rectangular in shape, integrally connected and extending into a flexing area 28 of the hinge member. The flexing area 28 allows pivotal movement of the hinge and window and extends into a generally U-shaped attaching cup or clip portion 30 formed by the bending of another portion of hinge 25 back on itself. The flexing portion 28 extends generally perpendicularly to the fastening flange 26 and attaching clip portion 30 which are generally parallel to one another. Stamped and bent outwardly generally parallel to the fastening flange 26 is a second, smaller fastening flange 32 which is spaced behind the main fasten-

ing flange 26 by a distance equivalent to the width of the window pane 12, which is preferably glass, as shown in Figure 4. Together the flanges 26 and 32 form a channel which receives an edge of the window pane 12 which is secured directly to those flanges by a suitable bonding adhesive layer 34 (Figures 3 and 4). The bonding adhesive is preferably applied directly to the inside surfaces of the flanges 26, 32 during manufacture of the hinge member 25 such that, during later manufacture of the window assembly, the window pane 12 need merely be placed within the hinge member and the adhesive activated by heat or another means to securely bond the hinge member to the glass in the desired location. No drilling or machining of the window pane is necessary for receipt of the hinges. Thus no hinge structure extends through the pane 12.

The doubled back flanges of the attaching clip portion 30 are preferably spaced apart by a distance slightly less than the width of the pinch-weld flange 16. The clip is then expanded to provide a friction fit on the flange 16. Lanced out of one of the flanges of the attaching clip portion 30 is a spring metal detent tab 36 which extends inwardly toward the centre of the attaching clip. The detent tab 36 is designed to engage the edge of an aperture 17 formed through the pinch-weld flange 16 in a desired location corresponding to the location of the hinge in the assembly 10 as shown in Figures 2, 3 and 4. Once the hinges 25 are secured to the window assembly, they need only be installed by sliding the attaching clip portions 30 over the edge of the pinch-weld flange 16 such that the detent tabs 36 are in alignment with the aperture 17. Such sliding action cams the detent tabs 36 outwardly until they are received within the recess or aperture 17 and prevent the removal of the hinge members 25 from the pinch-weld flange.

Also attached directly to a surface of the window pane or glass 12 is a pivot latch assembly 37 including a metallic base member 38 secured to the glass by bonding an adhesive layer 39 as shown in Figures 1 and 8. The metal-to-glass bond for the pivot latch assembly 37 is the same as that for the metal-to-glass bond for the hinge members 25. The pivot latch assembly 37 is of the type described in United States Patent 4,139,234, and is designed to provide an over-centre-type toggle latch to retain the window in the closed position against sealing the weather strip 40 or to open the window by moving it to its open position shown in Figure 1 and in phantom in Figure 6. The pivot latch assembly 37 may be secured to the glass other than with a bonding adhesive such as by a generally U or J-shaped flange 39a (shown in phantom in Figure 8) which would extend around the edge of one portion of the window pane 12, or by means of a bolt or other fastener extending through a hole drilled through the glass as is shown in prior United States patent 4,139,234. The opposite end of the pivot latch assembly 37 may be secured to the pinch-weld flange 16 such as at an aperture 19 generally adjacent the position of the assembly on the window pane.

A preferred adhesive system found suitable for attachment of either the hinge members 25 or the base 38 of the pivot latch assembly 37 directly to a surface of the glass window pane 12, and especially to tempered glass, is that marketed under the trademark "Tenabond" by Illinois Tool Works, Inc. of Elgin, Illinois. Such an adhesive system includes an epoxy adhesive layer 34 or 39, typically applied directly in tape form on the metal hinge member 25 or pivot latch assembly base stud 38 and between that hinge member or stud and the glass surface. The stud or hinge member is pressed against the adhesive and rapidly heated using an induction heating apparatus of the type shown in any one of United States Patent Nos. 3,816,690, 4,032,740, 4,163,884 or 4,167,259. Such heating apparatus activates the adhesive and causes the hinge member or stud to be rigidly and securely bonded by what is believed to be a mechanical bond directly to the glass surface. Such induction heated adhesives more securely bond metal to glass than do cold, unheated adhesives. Moreover, the induction heating system provides localized heat which is sufficiently intense to properly activate the adhesive without affecting the temper of the glass to which the hinge member or stud is being applied. Accordingly, the strength and integrity of the glass to which the hinge member or stud is bonded is not affected by the heating and the resultant metal-glass assembly is stronger and more durable than with other adhesives.

Other suitable adhesives for metal-to-glass bonds useful in the present invention include anaerobic polyacrylate cement such as that described in United States Patent 3,885,072, vinyl acetate/phenol formaldehyde containing adhesives such as that described in United States Patent 2,502,970, or epoxy containing cement such as that described in Canadian Patent 702,578.

Tests performed on a hinge member such as that shown at 25 herein and having a flange 26 of 19.05 mm by 19.05 mm (0.75 by 0.75 inches) bonded directly to a sheet of tempered glass with the above-described Tenabond adhesive system, specifically adhesive product No. TP-805I showed that the hinge could withstand  $3.958 \times 10^5 \text{ kg/m}^2$  (563 p.s.i.) in shear and  $7.031 \times 10^5 \text{ kg/m}^2$  (1000 p.s.i.) in tension without separating from the glass surface after exposure to hot and cold temperature cycling, high humidity soaking and hot water soaking, and ultraviolet light (simulated sunlight). Such environmental testing of the Tenabond adhesive securing metal to glass in such conditions indicates such bonds exhibit strengths in excess of those required for proper retention of vehicles.

With reference to Figures 1, 2 and 4 to 6, the preferred form of sealing weather strip 40 is provided in the outline of the pinch-weld flange 16 around the window aperture 14 in the vehicle body. The sealing weather strip 40 is preferably moulded in strips which are glued or otherwise secured together with corner pieces 41 (Figure 1) to form the closed outline. It is preferably moulded

from flexible, resilient, sealing material such as synthetic rubber, foam rubber or the like. One suitable synthetic rubber is EPDM (a terpolymer elastomer made from ethylene-propylene terpolymer). A channel-shaped, resilient metal, reinforcing insert 42 is moulded within the channel portion 44 of the strip. The channel portion 44, like the reinforcing metal insert 42, is generally U-shaped and has a pair of slightly converging legs 46, 48 which fit over both the attaching clip portion 30 of the hinge member 25 and the pinchweld flange 16. The converging legs 46, 48 press against the pinch-weld flange 16 to hold the weather sealing strip 40 in place and also help to secure the hinge members 25 in their proper location.

As is best seen in Figures 4, 5 and 6, the sealing weather strip 40 also includes a protruding integral sealing strip 50 which includes a sealing leg or flange 52 extending along the entire length of the channel portion 44 and generally parallel to the channel legs 46, 48. The sealing leg 52 has an outside surface which abuts against the inside surface of the window pane 12, as well as portions of the hinge member 25, such as the securing flange 32, when the window is pivoted to its closed position. Such engagement effectively seals out any moisture, dirt or other foreign particles which might enter between the window and the body pinch-weld flange. Such sealing may be enhanced by including extended sealing lips such as those shown in phantom at 52a, 52b in Figure 7 and extending from the free ends of the channel legs 46, 48. The lips 52a, 52b facilitate the overall sealing function of the sealing strip 40 at locations spaced from the hinged members 25. The hinges 25 extend through such lips through appropriate apertures provided in the sealing strip.

Referring now to Figure 9, a modified embodiment 55 of the hinged window assembly is shown. The assembly 55 is similar in all respects to embodiment 10 or the window assembly, wherein like numerals indicate like parts, except for the flexing area and attaching portions of hinge members 56. The hinge member 56 includes channel-like fastening flanges 57, 58 similar in all respects to the flanges 26, 32 in the assembly 10. These flanges are secured to the front and back surfaces of the glass window pane 12 with a suitable adhesive bonding layer 34 as described above. The hinge member 56 provides a single attaching flange 60 extending generally parallel to the flanges 57, 58 and including a formed aperture 62 designed to mate with the threads of a threaded fastener 64 extending through aperture 17 in the pinch-weld flange 16. An aperture 66 is provided through the leg 48 of the sealing member 40' which otherwise is exactly similar to sealing member 40 described above. The channel portion of the sealing member 40' is thus placed over the flange 60 with the fastener 64 extending through the aperture 66 such that the sealing strip 40' is in the proper location to seal against the inside surface of the

window pane 12 as shown in Figure 9. A flange 68, extending from the securing flange 60, is riveted at two spaced locations on either side of the central fastening flange 58 to a flange 59 extending from the channel portions 57, 58 with rivets 69. Thus, when the window assembly 55 is pivoted, the entire window pane will move via the flexing which occurs in the flange 68 adjacent its corner with the securing flange 60, while the window pane and securing portions of the hinge member 56 are held thereto by means of the rivets 69.

As shown in Figure 10, another hinged window assembly 70 includes both a modified hinge member 72 and a modified sealing weather strip 80. The hinge member 72 includes a single fastening flange 74 which extends along and is bonded to the front surface of the glass window pane 12 by a suitable adhesive layer 34 as described above. The hinge member 72 does not include any central, opposing fastening flange on the back surface of the glass, however. The hinge member includes a flexing portion 76 extending at a slightly acute angle to the fastening flange 74 which extends into an attaching clip portion 78 having depressed detent areas 79a, 79b adapted to be received in the aperture 17 of the pinch-weld flange 16. The depressed, detent areas 79a, 79b are not lanced out of the sheet metal clip portion 78 but rather are offset and connected continuously with the clip portion 78. These detent areas provide a double, positive lock on the pinch-weld flange.

The strip sealing member 80, which is preferably formed from synthetic rubber like the strip member 40, includes a generally U-shaped channel portion formed by legs 82, 84 reinforced by an internal, resilient metallic, reinforcing insert 86 formed in a U-shape and moulded therewithin. The inside surfaces of the legs 82, 84 include lips or flanges 87a, b, c, d and e which provide a sealing function and engage the exterior surfaces of the attaching clip portion 78 and the pinch-weld flange 16 as indicated in Figure 10. A hollow or bulbous, flexible sealing portion 88 extends integrally from the exterior side of the weather strip 80 against the inside surface of the glass pane 12 to complete the sealing of the assembly between the glass and the pinch-weld flange 16.

A further window assembly 90 is shown in Figure 11 and includes a modified hinge member 92 and a modified weather sealing strip 100. The hinge member 92 is similar in most respects to the hinge member 25 except for the inclusion of a hinge pivot formed by mating, rolled cylindrical hinge plate portions 94, 96 extending from the opposing, glass window pane retaining section 95 and the attaching clip sections 99 of the hinge member. A pivot pin 98 is inserted through the mating rolled portions to allow pivotal movement of the glass pane 12 to which the retaining hinge section 95 is secured. The attaching clip portion 99 is substantially similar to the attaching clip portion 30 of member 25.

The sealing strip 100 is similar to strip 40 except

for the inclusion of a series of three, generally parallel, curved sealing strips 102, 104 and 106 having free ends which engage the inside surface of the window pane adjacent its peripheral edge for sealing purposes. These sealing flanges are curved for resiliency against the inside surface of the glass 12 and to provide clearance room for the pivot hinge portion as shown in Figure 11.

The hinged window assembly embodiment 110, where like numerals indicate like parts to those embodiments described above, also includes a modified hinge member 112 which is similar in all respects to the hinge member 25 except that it is formed in two parts with the glass window pane retaining section 114 having flanges 116 spaced on either side of a retaining flange 115 and riveted to a flange 118 of the attaching clip portion 117. The clip portion 117 includes a detent member 119 for retention in the aperture 17 of the pinch-weld flange 16. The sealing weather strip member used in this assembly is the same as strip 40 used in assembly 10.

In Figure 13 is shown a hinged window assembly 120 including both a modified hinge member 122 and a modified sealing weather strip 135. The hinge member 122 includes a generally rectangular retaining flange 124 which is bonded to the front surface of the glass window pane 12 by means of the adhesive layer 34 in the manner described above. Offset toward the back surface of the hinge from the centre of the flange 124 is a spaced retaining flange 126. An adhesive layer is also included on the inside surface of the flange 126. The flanges 124, 126 merge into an attaching flange 128 which includes an aperture therethrough receiving a sheet metal bolt 129 extending into the body sheet metal of the vehicle. In this case, the body sheet metal is formed from an exterior sheet 18a and an interior sheet 20a forming a pinch-weld flange 16a which does not include any aperture therethrough.

Moulded around the entire peripheral edge of the window glass 12, and about the hinge member 122, is an edge trim or casing 130 moulded from a suitable resinous plastic such as polyvinyl chloride to provide a finished trim around the entire periphery of the window pane. The trim or casing 130 includes an exterior or front flange 132, a rear or interior flange 133, and a peripheral edge portion 134, all of which directly engage the glass surfaces and are bonded thereto in a moulding process for permanent retention.

The sealing weather strip 135 is similar to the strip 40 except that in place of the sealing flange 52, a solid, flexible, bulbous sealing portion 136 which engages the inside surface of the glass window pane 12 is included integrally with the channel-like portion 137 which secures the strip over the pinch-weld flange 16a.

A hinged window assembly 140 is shown in Figure 14 and includes a modified hinge member 142 and sealing weather strip 150. The hinge members 142 include a channel-like glass window pane retaining section having a front flange

144 and a rear flange 146. The rear flange 146 is bent upwardly out of an attaching flange 148 to form an aperture through the flange 148. The flange 148 doubles back on itself in a generally U-shape and receives a securing screw 129 through the aperture in that flange and through the flange portion 149 into the sheet metal of the vehicle body to retain the glass and hinge member assembly thereto. The proximity of the edge of the window pane retaining section of the hinge 142 to the sheet metal 18a effectively conceals the screw 129 from sight after installation and prevents its removal unless the weather strip is removed or the assembly 140 is flexed inwardly beyond its normal position. Also the U-shaped bend between the flanges 148, 149, together with the clearance opening through the flange 148 for the head of the bolt 129, allow greater movement than in other hinge members. The glass pane 12 is also bonded to the retaining portions of the hinge member by a suitable adhesive layer 34 as described above.

The sealing weather strip 150 includes a hollow central attaching portion 152 and bulbous sealing members 154, 156 on either side. The sealing flange 156 is substantially similar to the sealing flange 52 in the strip 40. The central attaching portion 152 includes a modified metallic reinforcing insert 58 centred within moulded attaching legs 159, 160 which extend downwardly and curve back upon themselves to retain and clamp the pinch-weld flange 16a therebetween as shown in Figure 14.

A final embodiment of hinged window assembly 165 is shown in Figure 15 and includes a substantially rectilinear hinge member 166 which includes a retaining end 168 bonded to the front surface of the glass window pane 12 by a suitable adhesive layer 34 as described above and an opposing retaining end 169 having an aperture therethrough which receives a retaining screw 129 extending into the vehicle body sheet metal. Seated over the pinch-weld flange 16a is a sealing weather strip 170 which is substantially similar to the strip 150 shown in Figure 14 except for the inclusion of a continuous exterior sealing flange 172 which forms a closed bulbous portion engaging both the inside surface of the glass window pane 12 as well as the shoulder of the recess leading to the pinch-weld flange 16a on the exterior sheet metal body portion 18a. In order to conceal the fastener 129 for the hinge 166, a metal covering 174 extending from the roof or another portion of the vehicle may extend over the fastener 129 and a substantial portion of the hinge member 166 to a position substantially equivalent to the end of the pinch-weld flange 16a as shown in Figure 15.

As will now be understood, hinged window assemblies 10, 55, 70, 90, 110, 120, 140 and 165 all provide concealed fastening of the assembly to a vehicle body because the attaching portions of the hinge members are concealed behind the assembly, or are covered by an adjoining body portion when the assembly is secured in a vehicle

body. Viewing of the assembly from the exterior side 18 or 18a of the vehicle does not reveal how the hinge members are secured to the vehicle. In addition, the assemblies provide a complete seal around the entire window opening and, when the window is in its closed position, an effective seal around the entire periphery of the glass is provided. Moreover, the metal hinges provide security against vandalism and theft because the window cannot be removed merely by cutting away the weather strip. In addition, the assembly provides distinct assembly advantages during manufacture of the vehicle since it can be applied substantially entirely from the exterior of the vehicle with perhaps only a final fastening step being required from the vehicle interior. For example, in Figure 9 the screws 64 are applied from the vehicle interior as a final step. Also, the assembly is substantially finished when installed and need not be provided with any additional, separate pieces of trim.

#### Claims.

1. A hinged window assembly (10, 55, 70, 90, 110, 120, 140, 165) for vehicles comprising: a window pane (12) having front, back and peripheral edge surfaces; hinge means (25, 56, 72, 92, 112, 122, 142, 186) for moving the window pane between at least an open and a closed position and including a flange (26, 56, 74, 95, 114, 124, 126, 144, 146, 168) for fastening the hinge to the window pane (12), the flange being directly and rigidly secured to the window pane by being bonded by bonding means to at least one of the surfaces of the window pane at a specified location without any structure extending into or through the window pane; a sealing means (40, 40', 80, 100, 135, 150, 170) cooperating with the window pane for attachment to a portion of a vehicle and forming a weather seal between the window pane and the vehicle portion when the assembly is installed on a vehicle and the window pane is in the closed position; and wherein the assembly is adapted for installation substantially entirely from the exterior of a vehicle; characterized in that the assembly comprises a plurality of hinge means formed from metal and including attaching means (30, 60, 78, 99, 117, 128, 149, 169) for attaching the hinge means to a portion (16) of a vehicle and a metal flexing portion (28, 68, 76, 94, 96, 98, 116, 118, 148) which connects the flange and the attaching means; the metal flexing portion spacing the window pane from the attaching means and adapted to flex and provide movement of the flange and the window pane with respect to the attaching means when the pane is moved between the open and the closed positions.

2. A hinged window assembly as claimed in claim 1 in which the window pane (12) is glass and the bonding means includes an adhesive chosen from the group of adhesives which include anaerobic polyacrylate cement, vinyl acetate/phenol formaldehyde, or epoxy cement,

and heat activatable epoxy cement adapted for activation by induction heating.

3. A hinged window assembly as claimed in either of the preceding claims in which the metal flexing portion (28; 76; 116, 118; 128; 148, 149) is formed from resilient sheet material and is spaced from the window pane (12) and between it and the attaching means (30, 60, 78, 99, 117, 128, 149, 169).

4. A hinged window assembly as claimed in claim 3 in which the flange (26, 28; 74, 76; 114, 116, 118; 124, 124, 128; 144, 148, 149) forms a channel for receiving and securing a portion of a peripheral edge of the window pane (12); the bonding means being intermediate interior portions of the flange and the window pane (12) in the channel and securing the hinge plate to both the front and back surfaces of the window pane (12).

5. A hinged window assembly as claimed in any one of the preceding claims in which the attaching means for attaching the hinge to a portion of a vehicle include a concealed clip (30, 78, 99, 117) adapted to be received over a flange (16, 16a) of a sheet metal vehicle body.

6. A hinged window assembly as claimed in any one of the preceding claims in which the sealing means (40, 40', 80, 100, 135, 150, 170) include receiving means (46, 48; 82, 84; 137; 159, 160) for receiving a portion of the hinge means whereby the sealing means are secured on the hinge means adjacent the window pane (12) for sealing engagement therewith when the window pane (12) is closed.

7. A hinged window assembly as claimed in any one of the preceding claims in which the sealing means (40, 40', 80, 100, 135, 150, 170) is formed from flexible, resilient sealing material and includes channel means (44) for receiving a flange of a vehicle body adjacent a window opening and an integral sealing member extending along the channel means (44) for engaging the window pane (12).

8. A hinged window assembly as claimed in any one of the preceding claims in which the peripheral edge surface of the window pane (12) includes a trim member (130) extending along the edge of the window pane (12) to provide the assembly with a finished appearance.

9. A hinged window assembly as claimed in claim 8 in which the trim member (130) includes a moulded casing extending around at least a portion of the peripheral edge of the window pane (12), the flange for fastening the hinge to the window pane (12) being at least partially embedded within the moulded casing.

#### Patentansprüche

1. Drehbare Fensteranordnung (10, 55, 70, 90, 110, 120, 140, 165) für Fahrzeuge, umfassend: eine Fensterscheibe (12) mit einer Vorder- und einer Rückseite sowie mit einer Umgangsrandfläche; eine Scharniereinrichtung (25, 56, 72, 92, 112, 122, 142, 186) zum Verstellen der Fenster-

scheibe zwischen wenigstens einer geöffneten und einer geschlossenen Stellung, mit einem Flansch (26, 56, 74, 95, 114, 124, 126, 144, 146, 168) zum Befestigen des Scharnieres an der Fensterscheibe (12), wobei der Flansch direkt und fest mit der Fensterscheibe verbunden ist, indem er mit Hilfe eines Bindemittels mit wenigstens einer der Oberflächen der Fensterscheiben an einer bestimmten Stelle haftend verbunden wird, ohne daß sich ein Bauteil in die Fensterscheibe hinein oder durch sie hindurch erstreckt; eine mit der Fensterscheibe zusammenwirkende Dichtungseinrichtung (40, 40', 80, 100, 135, 150, 170), die an einem Teil des Fahrzeugs angebracht wird und eine Regenleiste zwischen der Fensterscheibe und dem Fahrzeugteil bildet, wenn die Anordnung an einem Fahrzeug angebracht und die Fensterscheibe geschlossen ist; wobei die Anordnung so beschaffen ist, daß sie im wesentlichen vollständig von der Außenseite des Fahrzeugs installiert werden kann; dadurch gekennzeichnet, daß die Anordnung eine Anzahl von Scharnierelementen aus Metall mit Befestigungsteilen (30, 60, 78, 99, 117, 128, 149, 169) zur Befestigung der Scharnierelemente an einem Teil (16) des Fahrzeugs und ein biegssames Metallteil (28, 68, 76, 94, 96, 98, 116, 118, 148) enthält, das den Flansch und die Befestigungsteile verbindet, wobei das biegssame Metallteil einen Zwischenraum zwischen der Fensterscheibe und den Befestigungsteilen herstellt und so beschaffen ist, daß es sich biegen läßt und eine Bewegung des Flansches und der Fensterscheibe bezüglich der Befestigungsteile erlaubt, wenn die Scheibe zwischen der geöffneten und der geschlossenen Stellung bewegt wird.

2. Drehbare Fensteranordnung nach Anspruch 1, bei der die Fensterscheibe (12) aus Glas besteht und das Bindemittel ein Haftmittel aufweist, das aus der Gruppe von Haftmitteln ausgewählt ist, die anaerobes Polyakrylatbindemittel, Vinylacetat/Phenoformaldehyd oder Epoxidkleber sowie wärmeaktivierbaren Epoxidkleber, der für die Aktivierung durch induktive Wärmebehandlung geeignet ist, umfaßt.

3. Drehbare Fensteranordnung nach einem der vorhergehenden Ansprüche, bei der das biegssame Metallteil (28; 76; 116, 118; 128; 148, 149) aus federndem Blech gebildet ist und von der Fensterscheibe (12) beabstandet und zwischen dieser und den Befestigungsteilen (30, 60, 78, 99, 117, 128, 149, 169) angeordnet ist.

4. Drehbare Fensteranordnung nach Anspruch 3, bei der der Flansch (26, 28; 74, 76; 114, 116, 118; 124, 126, 128; 144, 148, 149) eine Rinne zur Aufnahme und Befestigung eines Teiles der Umfangskante der Fensterscheibe (12) bildet, wobei das Bindemittel in der Rinne zwischen den inneren Teilen des Flansches und der Fensterscheibe (12) zu liegen kommt und die Scharnierplatte dadurch sowohl an der Vorder- als auch an der Rückseite der Fensterscheibe (12) befestigt wird.

5. Drehbare Fensteranordnung nach einem der vorhergehenden Ansprüche, bei der die Befesti-

gungsteile zur Befestigung des Scharnieres an einem Abschnitt des Fahrzeugs eine verborgene Klammer (30, 78, 99, 117) aufweisen, die auf einen Rand (16, 16a) des Fahrzeuggehäusebleches aufsetzbar ist.

5 6. Drehbare Fensteranordnung nach einem der vorhergehenden Ansprüche, wobei die Dichtungseinrichtungen (40, 40', 80, 100, 135, 150, 170) eine Aufnahmeeinrichtung (46, 48; 82, 84; 137; 159, 160) zur Aufnahme eines Teiles der Scharniereinrichtung aufweisen, so daß die Dichtungseinrichtungen an der Scharniereinrichtung unmittelbar an der Fensterscheibe (12) anliegend befestigt sind und mit dieser dichtend abschließen, wenn die Fensterscheibe (12) geschlossen ist.

10 7. Drehbare Fensteranordnung nach einem der vorhergehenden Ansprüche, wobei die Dichtungseinrichtungen (40, 40', 80, 100, 135, 150, 170) aus biegssamem, nachgiebigem Dichtungsmaterial bestehen und einen rinnenförmigen Teil (44) zur Aufnahme eines an die Fensteröffnung angrenzenden Randes eines Fahrzeuggehäuses und ein daran angeformtes Dichtungselement aufweisen, das entlang des rinnenförmigen Teils (44) verläuft, um mit der Fensterscheibe (12) abzuschließen.

15 8. Drehbare Fensteranordnung nach einem der vorhergehenden Ansprüche, wobei die Umfangsrandfläche der Fensterscheibe (12) eine Zierleiste (130) aufweist, die entlang des Randes der Fensterscheibe (12) verläuft, um dem Fenster ein gefälliges Äußeres zu verleihen.

20 9. Drehbare Fensteranordnung nach einem der vorhergehenden Ansprüche, wobei die Zierleiste (130) eine formgepreßte Verkleidung aufweist, die um wenigstens einen Teil der Umfangskante der Fensterscheibe (12) herum verläuft, wobei der Flansch zur Befestigung des Scharnieres an der Fensterscheibe (12) wenigstens teilweise von der formgepreßten Verkleidung umschlossen wird.

#### Revendications

25 45 1. Ensemble de fenêtre orientable (10, 55, 70, 90, 110, 120, 140, 165) pour véhicules, comprenant: une vitre (12) comportant une surface avant, une surface arrière et une surface de bord périphérique; des moyens formant charnière (26, 56, 72, 92, 112, 122, 142, 186) permettant de déplacer la vitre de la fenêtre entre au moins une position ouverte et une position fermée et incluant une bride (26, 56, 74, 95, 114, 124, 126, 144, 146, 168) permettant de fixer la charnière à la vitre (12) de la fenêtre, la bride étant fixée directement et rigide-  
50 55 ment à la vitre de la fenêtre par collage à l'aide de moyens adhésifs sur au moins l'une des surfaces de la vitre de la fenêtre, en un emplacement spécifié, sans aucune structure pénétrant dans ou traversant la vitre de la fenêtre; des moyens d'étanchéité (40, 40', 80, 100, 135, 150, 170) coopérant avec la vitre de la fenêtre pour sa fixation à une partie d'un véhicule et établissant une étanchéité vis-à-vis des intempéries entre la vitre de la fenêtre et cette partie du véhicule,

lorsque l'ensemble est monté sur un véhicule et que la vitre de la fenêtre est dans la position fermée; et dans lequel l'ensemble est adapté pour être monté sensiblement entièrement de l'extérieur d'un véhicule; caractérisé en ce que l'ensemble comporte une pluralité de moyens formant charnière, réalisés en métal et comportant des moyens de fixation (30, 60, 78, 99, 127, 128, 142, 169) servant à fixer les moyens formant charnière à une partie (16) d'un véhicule, et une partie métallique flexible (28, 68, 76, 94, 96, 98, 116, 118, 148), qui relie la bride et les moyens de fixation; la partie métallique flexible maintenant la vitre de la fenêtre écartée des moyens de fixation, et étant apte à fléchir et permettre un déplacement de la bride et de la vitre de la fenêtre par rapport aux moyens de fixation lorsque la vitre est déplacée entre la position ouverte et la position fermée.

2. Ensemble de fenêtre orientable selon la revendication 1, dans lequel la vitre (12) de la fenêtre est en verre et les moyens adhésifs incluent un adhésif choisi parmi le groupe d'adhésifs comprenant un ciment de polyacrylate anaérobie, de l'acétate de vinyle/phénol-formaldéhyde, ou un ciment époxy, et un ciment époxy pouvant être activé par la chaleur et apte à être activé par un chauffage par induction.

3. Ensemble de fenêtre orientable selon l'une quelconque des revendications précédentes, dans lequel la partie métallique flexible (28; 76; 116, 118; 128; 148, 149) est réalisée en une tôle élastique et est écartée de la vitre (12) de la fenêtre et est située entre cette vitre et les moyens de fixation (30, 60, 78, 99, 117, 128, 149, 169).

4. Ensemble de fenêtre orientable selon la revendication 3, dans lequel la bride (26, 28; 74, 76; 114, 116, 118; 124, 124, 128; 144, 148, 149) constitue un profilé en U servant à recevoir et à fixer une partie d'un bord périphérique de la vitre (12) de la fenêtre; les moyens adhésifs étant situés entre des parties intérieures de la bride et la vitre (12) de la fenêtre dans le profilé en U et fixant la plaque de charnière à la fois aux surfaces avant et arrière de la vitre (12) de la fenêtre.

5. Ensemble de fenêtre orientable selon l'une quelconque des revendications précédentes, dans lequel les moyens de fixation permettant de fixer la charnière à une partie d'un véhicule comprennent une pince masquée (30, 78, 99, 117) pouvant être montée sur une bride (16, 16a) d'une carrosserie en tôle métallique d'un véhicule.

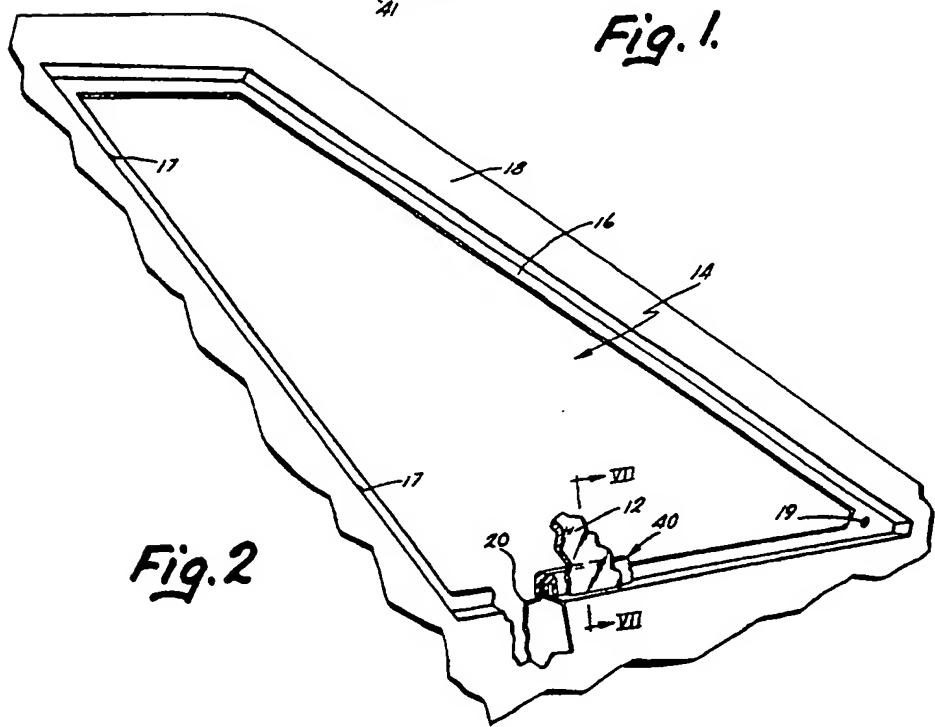
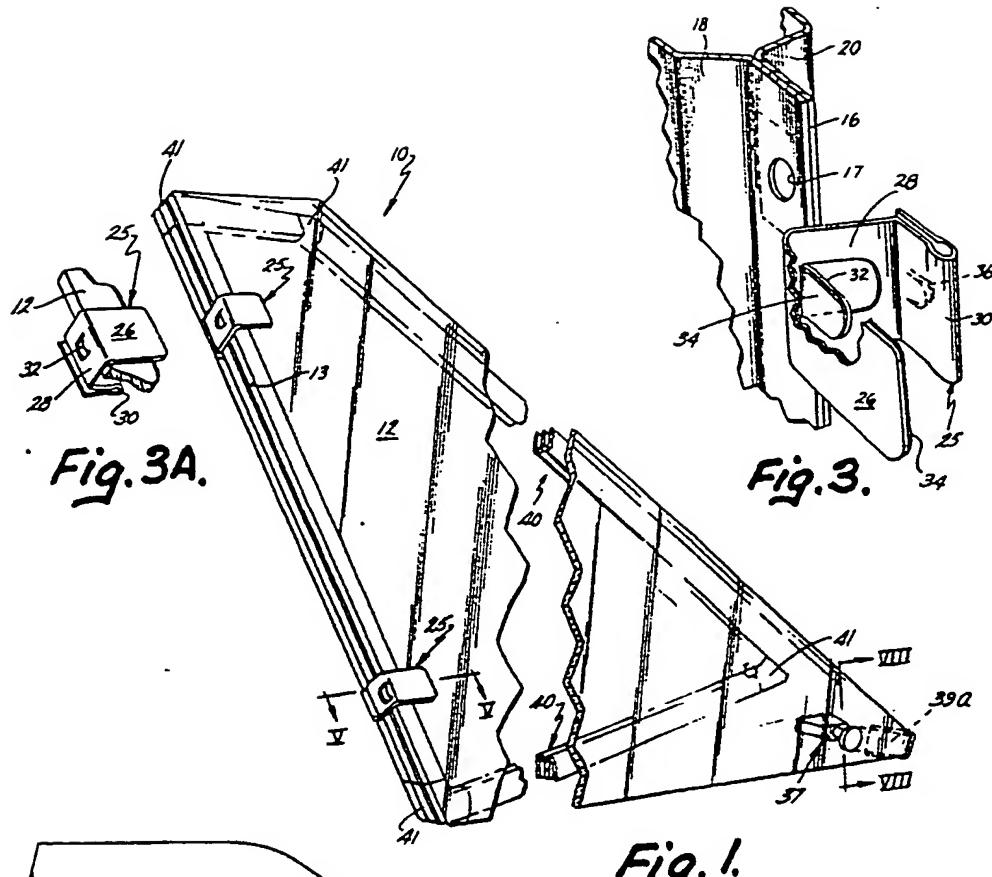
6. Ensemble de fenêtre orientable selon l'une quelconque des revendications précédentes, dans lequel les moyens d'étanchéité (40, 40', 80, 100, 135, 150, 170) comprennent des moyens récepteurs (46, 48; 82, 84; 137; 159, 160) servant à recevoir une partie des moyens formant charnière, ce qui a pour effet que les moyens d'étanchéité sont fixés sur les moyens formant charnière au voisinage de la vitre (12) de la fenêtre de manière à s'appliquer d'une manière étanche contre la vitre (12), lorsque cette dernière est fermée.

7. Ensemble de fenêtre orientable selon l'une quelconque des revendications précédentes, dans lequel les moyens d'étanchéité (40, 40', 80, 100, 135, 150, 170) sont réalisés en un matériau d'étanchéité flexible et élastique et incluent des moyens formant canal (44) destinés à recevoir une bride d'une carrosserie d'un véhicule, adjacente à l'ouverture de la fenêtre et un organe d'étanchéité monobloc s'étendant le long des moyens formant canal (44) pour s'appliquer contre la vitre (12) de la fenêtre.

8. Ensemble de fenêtre orientable selon l'une quelconque des revendications précédentes, dans lequel la surface de bord périphérique de la vitre (12) de la fenêtre comporte un organe formant enjoliveur (130) s'étendant le long du bord de la vitre (12) de la fenêtre de manière à conférer à l'ensemble un aspect fini.

9. Ensemble de fenêtre orientable selon la revendication 8, dans lequel l'organe formant enjoliveur (130) inclut une enveloppe moulée s'étendant autour d'au moins une partie du bord périphérique de la vitre (12) de la fenêtre, la bride servant à fixer la charnière à la vitre (12) de la fenêtre étant au moins partiellement encastrée à l'intérieur de l'enveloppe moulée.

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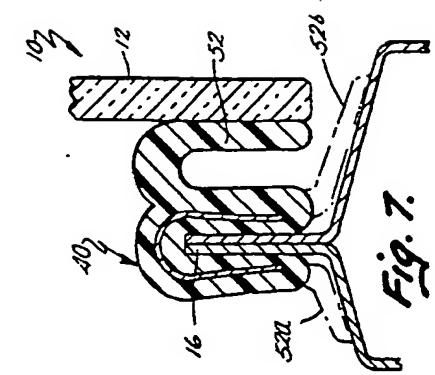


Fig. 7.

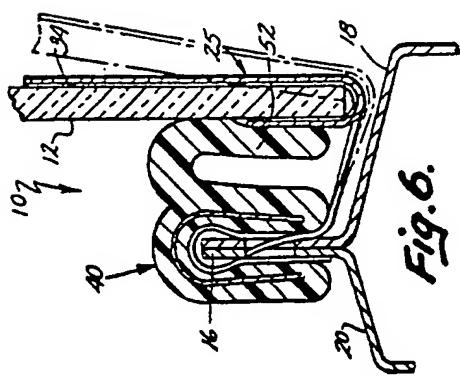


Fig. 6.

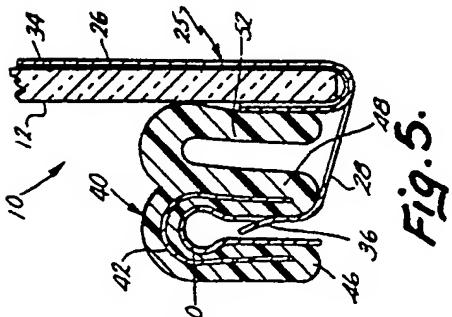


Fig. 5.

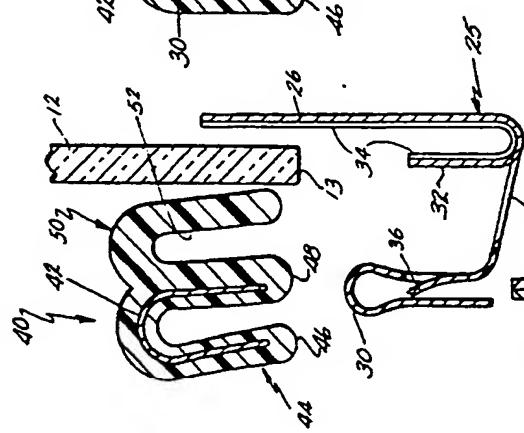


Fig. A.

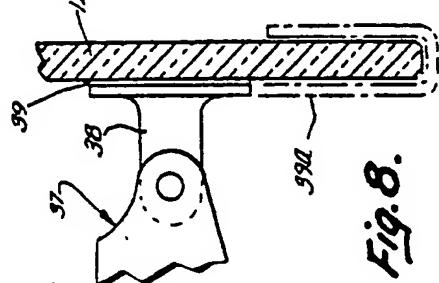


Fig. 8.

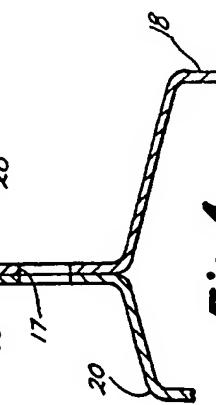


Fig. A.

